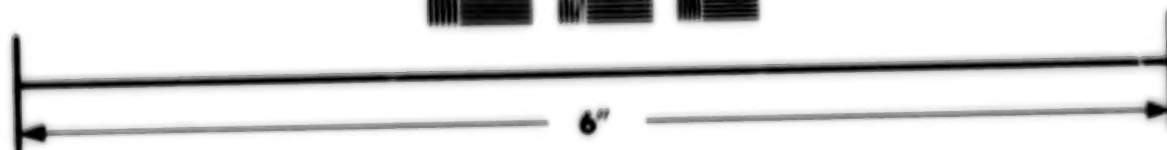
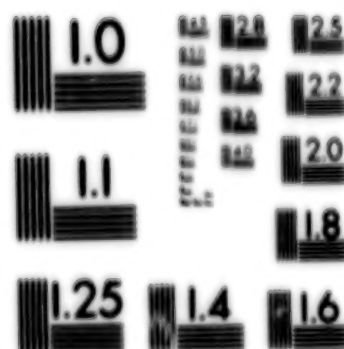


IMAGE EVALUATION TEST TARGET (MT-3)



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10 June 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 100

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10 June 1981

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GUAM PROTESTS JAPAN'S NUCLEAR DUMPING

OW180638 Tokyo KYODO in English 0603 GMT 18 May 81

[Text] Tokyo, 18 May (KYODO)--Gov Carlos Camacho of the northern Mariana Islands and Deputy Gov Joseph Ada of Guam Monday asked Japan to suspend its plans to dump radioactive waste in the Pacific. They made the request in a meeting with Ichiro Nakagawa, director general of the Science and Technology Agency. They claimed the project will cause more damage not only to people of Micronesia but also to Japanese than has been estimated by the agency.

Camacho and Ada then delivered a report backing their claim prepared by Jackson Davis, professor of biology of the University of California at Santa Cruz. Camacho said Japan's assessment on nuclear waste to be dumped into the Pacific Ocean has proved unconvincing after their own scientific review.

In reply to his request for suspension of the project, Nakagawa promised not to proceed unilaterally. The director general said his agency would continue to talk with people concerned until their consent is obtained.

The agency plans to dispose low-level radioactive nuclear waste in concrete-packed drums in the southwestern Pacific, some 700 kilometers north of the north Mariana Islands at depths of 6,000 meters from next year.

Professor Davis' report, worked out at the request of the legislature of the northern Mariana commonwealth, contends that the agency's assessment is based on 'scientific misconceptions and errors.' His report especially takes note that the nonsoluble waste accumulates over centuries at seabeds without evenly diffusing, and leaked radioactivity is enriched in the process of food cycle to affect Micronesian peoples and Japanese as well more seriously than expected by the agency. The report is to be introduced in the U.S. Congress Monday by the Guam delegate Antonio Won Pat.

CSO: 5100/2255

WORLDWIDE AFFAIRS

DISAGREEMENT BETWEEN S. AFRICA, U.S. OVER ENRICHED URANIUM SUPPLY

Kathmandu THE RISING NEPAL in English 11 May 81 p 3

[Text] Johannesburg, May 9--South Africa and the United States are embroiled in a legal and political tussle about the supply of enriched uranium by Washington for a nuclear power station at Koeberg near Cape Town, reports AFP.

The station-comprising two pressurised water reactors of 922 megawatts each was bought from France in 1974. The French firm Framatome is in charge of the enormous site, where several hundred engineers and workmen are engaged.

The first reactor is supposed to go into service next year and the second a year later.

The 1974 contract with the United States called for South Africa to supply natural uranium to the United States for enriching at a plant at Oak Ridge, Tennessee. A stipulation was that the enriched uranium should be moved next to France to be transformed into combustible "pellets" of uranium hexafluoride (UF-6) before being dispatched to South Africa.

But difficulties appear to have arisen between Pretoria and Washington with the United States invoking a Carter Administration decree of 1978 on nuclear non-proliferation.

The situation looks log-jammed. One clause of the 1974 contract between South Africa and the United States sets heavy penalties should the South African electricity supply commission fail to deliver the prescribed natural uranium on the date due.

But South Africa is in the embarrassing position of not knowing if it will be allowed to get back the enriched variety after treatment.

Informed sources in Pretoria have said that come what may France has undertaken to supply an initial batch of enriched uranium for the Koeberg power station when it comes onstream, that uranium could be drawn from France's own stocks.

The active life of such a "charge" of enriched uranium is about three years [as published], and the supply situation may have eased by then.

THE FINANCIAL MAIL, a local economic weekly, wrote that South Africa could choose to stick to the letter of the contract by sending the raw uranium to America on schedule, that would have to be before the end of this month.

Once enriched, that uranium could be stocked in a special depot at Portsmouth, Ohio, while awaiting a more favourable state of affairs, the paper said, adding that Spain was reported to have adopted that procedure. A week ago Mineral Resources and Energy Minister F. de Klerk disclosed that South Africa had managed to produce a small amount of enriched uranium and to turn it into fuel for an experimental reactor at Pelindaba.

The announcement could not have come at a more opportune time. South Africa seems well set to dispense with foreign help if it is refused.

CSO: 5100

BRIEFS

FRANCE, BRAZIL AGREEMENT DENIED--Brasilia, 11 May (AFP)--The Brazilian Foreign Ministry today denied that it has been negotiating a new nuclear agreement with another country, particularly with France. In answer to a question by the press, Itamaraty spokesman Bernardo Pericas denied rumors that Brazil will sign an agreement to install an experimental reprocessing plant as a result of a nuclear contract with an unidentified country. Mines and Energy Minister Cesar Cals recently announced the conclusion of a new nuclear agreement and the press has mentioned France and Italy as possible suppliers. [Text] [PY121337 Paris AFP in Spanish 0023 GMT 12 May 81]

FRANCE DELIVERS FUEL TO JAPAN--Paris, 14 May (AFP)--France has delivered a shipment of non-military nuclear fuel to the University of Tokyo for research, informed sources said here today. The fuel is of a special reduced enrichment formula made by the French Cerca Company under terms of the nuclear non-proliferation pact, the sources said. Cerca, jointly owned by Pechinery-Ugine Kuklmann and Framatome, was the first to commercially produce the fuel, which cannot be used in nuclear weapons. Nuclear specialists said the fuel, destined for the University of Tokyo's research reactor, was of a 20 percent for weapons. It was Japan's first such nuclear purchase abroad, a Cerca spokesman said. The International Atomic Energy Agency has recommended that low enrichment fuel be henceforth used exclusively in nuclear research reactors to promote the peaceful use of atomic energy. [Text] [NC141454 Paris AFP in English 1442 GMT 14 May 81]

BRAZIL, ITALY SIGN NUCLEAR AGREEMENT--Brasilia, 14 May (AFP)--Italy will build a fast breeder reactor in Brazil for research and will transfer the corresponding technology, a spokesman for the Mines and Energy Ministry told AFP today. An agreement will be signed next week by the two countries, thus implementing the 1971 protocol for bilateral scientific cooperation. It provides for expending \$9 million over a 3-year period. An announcement on 5 May had said that Brazil would sign a nuclear agreement with an unidentified country. [Excerpt] [PY150024 Paris AFP in Spanish 2219 GMT 14 May 81]

CSO: 5100/2255

UNION ACTION DELAYS YELLOWCAKE SHIPMENT IN BRISBANE

Brisbane THE COURIER-MAIL in English 8 May 81 p 15

[Text] The ship which was to have loaded 12 containers of uranium yellowcake--held in the Mayne railway yards--had by-passed Brisbane, State Parliament was told yesterday.

The Transport Minister, Mr Lane, told Mr Akers (Lib., Pine Rivers) Mary Kathleen Uranium Ltd was arranging for another ship to load the ore.

Last week four more containers of yellowcake joined the eight which have been sitting at the yards since April 6.

The \$12 million shipment has been held at the yard under police guard because of "reticence" by the Seamen's Union to handle the ore. The situation has been further complicated by rolling national stoppages by maritime unions over a Federal award dispute.

Mr Lane said he understood Mary Kathleen would not rail any further shipments from Mount Isa for export until firm shipping arrangements could be made.

The uranium is to be exported to Japan and the United States following conversion and enrichment in Canada.

The Seamen's Union has said it has not banned the ore export but was complying with official Australian Council of Trade Unions policy of not cooperating with the mining, transport and export of uranium.

Mary Kathleen general manager, Mr Colin Smith, said from Melbourne last night the matter had become one for the Federal Government.

At the minimum, Mr Smith said, the Federal Government should say publicly the union actions amounted to intimidation and blackmail.

"I don't know the ultimate resolution but there has to be one somewhere in this country," he said.

The union policy had no industrial base and, while society had given unions power and position for industrial reasons, it was wrong to use that power for political purposes.

"Unions have the right to opinions and the right to protest, but not to the extent of affecting other people's rights," Mr Smith said.

He understood the matter was to be considered at the senior level of Federal Government from yesterday.

The four extra containers had been sent because they were booked to leave the country through Brisbane.

Mr Smith said the company would be trying to book space on future vessels but, with two cancellations already, this would become more difficult.

CSO: 5100

BRIEFS

STATE NUCLEAR PREROGATIVES--Responsibility for regulating and controlling Australia's nuclear industry will be handed to the States and the Northern Territory. The Government announced that this would be done as far as possible, but the Commonwealth would maintain a coordinating role. Operation of non-marine parks, including the Kakadu national park in the Northern Territory, will be left to State administrations. "But 'essential' Commonwealth interests in Kakadu will be maintained." Labor's environment and conservation spokesman, Mr S. J. West (NSW), said the moves were a cross abrogation of the Government's responsibility. [Text] [Perth THE WEST AUSTRALIAN in English 1 May 81 p 16] The Minister for National Development Senator Carrick, sought yesterday to allay fears that the Federal Government would give up control of nuclear activities. He confirmed that little would change as a result of the Razor Gang's report and that all the responsibilities under the International Atomic Energy Agency would remain with the Commonwealth. [Text] [Sydney THE SYDNEY MORNING HERALD in English 6 May 81 p 12]

URANIUM 'COVERUP' CHARGE--Labor has alleged a Federal Government coverup on uranium mining. The Opposition spokesman for environment and conservation, Mr Stewart West, said the Government was refusing to release two documentary films on the environmental hazards involved. He said the Government objected to their content. The films, on environmental monitoring in the Kakadu region, were made by Film Australia and approved by the Supervising Scientist in February 1980. Mr West said: "The former Minister for Science and the Environment, Mr Thomson, viewed the films and immediately banned their release. "Amended scripts, altered due to some technical changes of Ranger minesite operations, were submitted on August 8, 1980 but they still have not been considered. Clearly the Government wants only its own rose-colored view of uranium mining to get through to the Australian public." [Text] [Canberra THE AUSTRALIAN in English 5 May 81 p 17]

JAPANESE TALKS BREAKDOWN--Canberra--Australian and Japanese officials have failed to reach agreement in negotiations for a nuclear safeguards treaty. Officials failed to agree on sensitive clauses in the draft agreement dealing with the reprocessing of nuclear waste. [Text] [Melbourne THE AGE in English 7 May 81 p 5]

HONEYMOON URANIUM APPROVAL--Adelaide--The South Australian Government declared yesterday the proposed Honeymoon uranium prospect, 75 kilometres north-west of Broken Hill, to be environmentally acceptable. The 40-page Government assessment of the environmental impact of the proposed \$40 million project follows two years of consultation between the assessments section of the South Australian Department of the Environment and the operating company, Brisbane-based Mines Administration Pty Ltd. In announcing the approval, the State Minister for Environment, Mr Wotton, said the main public concern had been the possibility of groundwater contamination and the effects of radiation. These aspects were examined in detail and no significant adverse impacts were identified. The assessment recommended that if the company decided to proceed with the project, it should carry out an approved radiation monitoring program, a groundwater monitoring program, be liable to clean up if there is any spillage of radioactive materials and a flora rehabilitation program. [Text] [Sydney THE SYDNEY MORNING HERALD in English / May 81 p 25]

CSO: 5100

FOUNDATION FOR ATOMIC RESEARCH BUILDING LAID

Dacca THE BANGLADESH OBSERVER in English 5 May 81 p 1

[Text] Dr R. A. Ghani, State Minister for Science and Technology, on Monday laid the foundation stone of the Atomic Research Reactor building at Savar complex of Bangladesh Atomic Energy Commission, reports BSS.

Speaking on the occasion, the State Minister urged upon the scientists, technologists and engineers to complete the civil work of the Taka 8 crore project within the scheduled time of December, 1982.

Dr Ghani said that atomic research began in Bangladesh in 1961. He said that with the limited facilities our scientists and technologists were now capable of designing and fabricating the reactor which is the most sophisticated science discipline. (as published) He said with the establishment of the research reactor it would be possible to produce isotope which is used in agriculture for better yield in industry for detection of fault and in medicine to diagnosis of diseases.

The State Minister said that the establishment of the 3 MW research reactor in Savar would pave the way for materialising the Rooppur power reactor in Pabna for generation of electricity.

He said that the reactor would serve the purpose of manpower development in reactor technology in the country and be opened for research scholars of universities and research establishments in Bangladesh.

Dr Anwar Hossain, Chairman Bangladesh Atomic Energy Commission, assured the State Minister that Bangladesh Atomic Energy Commission's scientists, technologists and engineers would whole heartedly work for fulfillment of the country's needs for harnessing atomic energy for speedy development, Dr A. B. Khan and Mr Anisur Rahman, Members BAEC among others, spoke on the occasion.

CSO: 5100

'EXPRESS' PLEASED WITH NUCLEAR POWER INDUSTRY REVIVAL

BK071512 Delhi INDIAN EXPRESS in English 1 May 81 p 6

[Editorial: "Nuclear Hopes"]

[Text] India's nuclear power programme is showing some welcome signs of recovery after nearly a decade of stagnation. Plans to harness atomic power were initiated with high hopes, but little foresight, in the sixties. The seventies showed how woefully the country was dependent on foreign suppliers for fuel, vital components of the reactor systems and material like heavy water. Sufficient ground work was not done to create indigenous production capability for meeting these requirements. Indian industry was either unwilling to produce a relatively small number of sophisticated equipment or its products did not come up to required standards. Scarcity of building materials also affected atomic power projects. As a result, installation schedules were delayed by 3 to 5 years with consequent cost escalation.

However, the compulsion to solve these problems with our own resources has now placed the programme on a more realistic basis. The manufacturing facilities under the Department of Atomic Energy have matured sufficiently to achieve nearly 75 percent indigenization of reactor systems. Schemes to increase heavy water production to a substantial extent in the next few years have been launched. Indian industry is also now better prepared to meet the demand for auxiliary components.

But there is no room for complacency. The government should see to it that the six 235 MW reactors sanctioned in the Sixth Plan are completed on schedule. Fuel fabrication and heavy water production must increase simultaneously to avoid delays in commissioning new power stations. The DAE's goal--to add 10 more reactors of this type in the next 2 decades--is ambitious but not impossible to achieve. Standardisation in the design of these reactors and the 500 MW reactors planned for the subsequent phase is a step in the right direction. So is the decision to make the most of infrastructural facilities by installing a cluster of four reactors, instead of two as is the procedure now, at each of the future sites. Even if these goals are met, nuclear energy's share in overall power generation is unlikely to increase substantially. At present its contribution is about 3 percent.

The DAE must also make efforts to ensure better operational efficiency in atomic power plants. One can understand Tarapur reactors running at half their capacity because of low stocks of imported fuel, but there is no excuse for the poor performance of the first unit of the Rajasthan atomic power station. Compared to 85 percent capacity generation in similar reactors abroad, the Rajasthan unit's efficiency declined from 64 percent in 1979 to 53 percent last year.

BRIEFS

URANIUM RESERVES ESTIMATE--New Delhi, 7 May--India has estimated reserves of about 67,000 tons of uranium which is considered adequate to meet the requirements of the country's currently envisaged nuclear power programme, Parliament was informed today. In a written reply in the Upper House, Prime Minister, Mrs Indira Gandhi, who is also in charge of the Department of Science and Technology, said that the bulk of the deposits occurred in Bihar State. There were indications that smaller deposits might exist in a few other states. Meanwhile, CPN Singh, Junior Minister for Science and Technology, informed the House that the Tarapur atomic power plant, near Bombay, worked only up to 49 per cent of its total capacity during 1980-81 (April-March) because of uncertainties over enriched uranium supplies from the USA. In a written reply he said that owing to delays in the receipt of enriched uranium from the USA, the power level of the plant had to be reduced for stretching the fuel cycle.--NAB/AFP [Text]
[Rangoon THE WORKING PEOPLE'S DAILY in English 9 May 81 p 6]

REPROCESSED URANIUM--India will never make nuclear weapons from plutonium extracted from reprocessed spent nuclear fuel. This assurance has been given by Prime Minister Mrs Gandhi to an anti-atomic bomb organization in Hiroshima, Japan. In a letter, Mrs Gandhi reiterated her government's strong opposition to nuclear warfare and said that India is utilizing nuclear energy only for peaceful purposes. Mrs Gandhi's letter was in reply to a query made by the organization earlier, following India's decision to reprocess spent uranium fuel supplied by the United States. [Text]
[BK300925 Delhi Domestic Service in English 0240 GMT 30 May 81]

CSO: 5100/2266

JAPAN

BRIEFS

RADIUM ABSORBENT DEVELOPMENT--Okayama, 15 May (KYODO)--A new radium absorbent has been developed jointly by a group of analytical chemists at the Okayama College of Science and the mineral laboratory of the Power Reactor and Nuclear Fuel Development Corporation at Ningyo Toge, Okayama Prefecture, it was learned Friday. The new absorbent is in the form of a white powder and is produced by a special process from titanitic acid. The group of chemists, led by Professor Yasumasa Shigetomi of the Okayama College of Science, began studying last May the possibility of making a new radium absorbent by using titanitic acid. The new material can reportedly absorb 100 percent of the radium contained in the water emitted during the processing of uranium ore. Furthermore, one gram can absorb three to 13 milligrams of uranium. At present, a synthetic resin called amidoxime is used to absorb uranium but it does not absorb radium. [Text] [Tokyo KYODO in English 1229 GMT 15 May 81 OW]

CSO: 5100/2255

BRIEFS

NUCLEAR POWER GENERATION PLANT--Taipei, 22 May (CNA)--The No 1 engine of the second nuclear power generation plant of the Taiwan Power Co started its trial run Thursday morning. The initial generation of electricity is 80,000 kilowatts, while its full capacity can reach 985,000 kilowatts. Taipower said that this is the first such generating engine ever completed in the world, which belongs to the sixth generation boiling water type nuclear engine set. The engine will be put on a 6-month trial run before it formally goes into operation. [Text] [Taipei CNA in English 0236 GMT 22 May 81 OW]

YELLOW CAKE PLANT TEST--Taipei, 16 May (CNA)--The Institute of Nuclear Energy Research and the China Phosphate Industries Corp. are conducting a test run on the newly established yellow cake plant, the Atomic Energy Council reported. Yellow cake is a substance refined from phosphoric acid from which uranium can be extracted. The extraction process is developed by the Institute of Nuclear Energy Research, an agency of the Atomic Energy Council, and has already acquired patent rights both at home and worldwide. Research and development began four years ago. After successful tests, the institute and the China phosphate industries began cooperation. The current plan is to produce 10 tons of uranium a year. [Text] [OW161313 Taipei CNA in English 0934 GMT 16 May 81]

CSO: 5100/2255

YUGOSLAVIA

BRIEFS

NEW NUCLEAR POWERPLANT--Zagreb, 28 Apr (TANJUG)--The executive council of the Constituent Republic of Croatia today positively assessed the hitherto preparations for the construction of a nuclear power plant at Prevalac, south-east of Zagreb, the republic's capital. The nuclear power plant at Prevalac will be built in cooperation with the Constituent Republic of Slovenia as was the case with the [words indistinct] nuclear power plant, the first such facility in Yugoslavia which is to go into trial operation this year. [Belgrade TANJUG in English 2110 GMT 28 Apr 81 LD]

CSO: 5100/2255

INTER-AMERICAN AFFAIRS

ARGENTINA-BRAZIL ACCORDS ON NUCLEAR EXCHANGE RATIFIED

Castro Madero, Batista Sign Notes

PY281555 Buenos Aires NOTICIAS ARGENTINAS in Spanish 0015 GMT 28 May 81

[Text] Buenos Aires, 27 May (NA)--Argentina and Brazil today took an important step forward toward the complementation of their nuclear programs by ratifying accords for the exchange of technology and fuel elements for their nuclear powerplants.

In accordance with these accords Argentina will loan Brazil 240 tons of natural uranium and will sell it zircalloy tubes, while a Brazilian enterprise, in partnership with a FRG enterprise, will participate in the construction of the Atucha II powerplant.

The draft accords were signed during the meetings held by Brazilian President Joao Figueiredo and the then-Argentine chief of state, Jorge Videla, first in Buenos Aires in May 1980 and then in Brasilia in August of the same year.

During the meeting held yesterday between Figueiredo and Argentine President Roberto Viola in Paso de los Libres, Corrientes Province, the two governments announced their decision to ratify these accords and to set into operation the mechanisms for the exchange of nuclear technology.

The accords were ratified through seven notes of mutual concessions signed this afternoon by the chairman of the National Atomic Energy Commission (CNEA), Vice Adm Carlos Castro Madero, and the president of the NUCLEBRAS (The Brazilian nuclear organization), Paulo Batista.

During the ceremony held to sign the accords at CNEA headquarters, both Castro Madero and Batista agreed that the complementation of Argentine and Brazilian nuclear programs "is not an attempt at creating a Latin American nuclear cartel."

In response to a question from NOTICIAS ARGENTINAS, CNEA's chairman did not deny the fact that the accords have "an essentially political meaning," because "at the economic level the exchange is not significant, since it will only amount to about \$6 million."

Castro Madero indicated that in keeping with the first note, Argentina will loan Brazil 267 tons of natural uranium (which will be sent in two 120-ton lots). These must be returned within 2 years at 6 percent annual interest.

"This means that at the end of 2 years Brazil will return 267 tons of uranium," added Castro Madero. He explained that by way of an experiment CNEA will export to Brazil 4,000 meters of zircalloy tubes for the Angra I nuclear powerplant.

He said that should Brazil "accept these tubes, it will purchase 160,000 meters of zircalloy tubes which will be used for reloading fuel elements for the Angra I nuclear powerplant for approximately 5 years."

He concluded by explaining that the Brazilian enterprise NUCLEP, in partnership with the FRG firm Kraftwerke Union, will participate in the construction of the parts for the pressure vessel of the reactor for the Atucha II nuclear powerplant, which is being built 100 km north of Buenos Aires.

NUCLEBRAS Chief Speaks

PY282338 Buenos Aires NOTICIAS ARGENTINAS in Spanish 2044 GMT 17 May 81

[Text] Buenos Aires, 27 May (NA)--The head of Brazil's atomic agency (NUCLEBRAS), Paulo Batista, denied here today that his country has any intention of manufacturing an atomic bomb.

He remarked this afternoon to NOTICIAS ARGENTINAS that "our nuclear program has exclusively peaceful aims, and I understand that this is Argentina's position also."

Batista stressed the importance of Argentine-Brazilian cooperation in the nuclear sector, which "is based on reciprocal opportunities without being detrimental to the respective national programs."

He stressed: "The objective of Brazil and Argentina is that of firmly seeking, with determination, nuclear autonomy, and this cooperation does not mean that Brazil depends on Argentina or vice versa."

Batista and Vice Adm Carlos Castro Madero, Chairman of the National Atomic Energy Commission (CNEA), ratified this afternoon the agreements that were signed on 17 May 1980 between the two governments.

In accordance with these agreements, Argentina will supply zircalloy tubes and other fuel elements to Brazilian atomic centers, and Brazil will participate in the construction of the Atucha II plant.

The chief of NUCLEBRAS highlighted, with emphasis, that these agreements "will eliminate any type of suspicion that could exist" regarding the nuclear intentions of Argentina and Brazil.

"This cooperation will demonstrate the peaceful intention of the nuclear programs of Brazil and Argentina, because our countries are not participating in the nuclear race."

CSO: 5100

SCIENTIST SCORES GERMAN CONTROL OF NUCLEAR PROGRAM

Rio de Janeiro GAZETA MERCANTIL in Portuguese 15 Apr 81 p 12

[Report from Porto Alegre by Delmar Marques]

[Text] "German technicians connected with Kraftwerk Union (KWU), a Siemens subsidiary, are in fact exercising complete control over the Brazilian nuclear program and are influencing the whole Brazilian energy policy," declared Professor Alfredo Aveline, a member of the board of the Brazilian Physics Society and member of the nuclear energy committee of the Brazilian Society for the Advancement of Science (SBPC). "Although some Brazilian officials are undecided about maintaining that program, the Germans, who are interested in promoting the sales of their country's nuclear industry, manage to impose their points of view. For a long time, the scientific community has been convinced that Brazil should stop at those plants already ordered," he told this newspaper.

According to Aveline, a professor in the physics department of the Federal University of Rio Grande do Sul, "NUCLEBRAS has several subsidiaries, the most important of which are technically controlled by KWU. That technical control is exercised by German directors belonging to the staffs of KWU or associated companies, such as Voest or Steag. Those directors rely on stockholders agreements that make all important activities of the NUCLEBRAS subsidiary dependent on their approval. Thus the technical control exercised by the Germans through the nuclear agreement is in fact complete control."

In his opinion, it is obvious that the whole effort of the technical directors connected with KWU is directed much more toward promoting the sales of German nuclear industry than toward the solution of Brazilian energy problems. In fact, because of their greater experience, they decisively influence the management of NUCLEBRAS to the point of imposing their own ideas on planning in the Brazilian energy sector. The statistics they present on predictions of electric energy demand are made in order to expand to the maximum the Brazilian market for equipment and services from the German nuclear energy."

He points out that if the projections made by the advocates of nuclear energy were taken seriously, the country would have to build a reactor every 60 days. "In 324 months, we would have to have 166 (as published) reactors of 1,200 megawatts each, a real absurdity imposed by the manipulation of figures regarding the exhaustion of hydroelectric sources and the growth of demand projected for after the year 2000. Brazilian technicians, who are merely figureheads for the Germans, endorse those senseless projections."

Aveline said that of the 11 Pressurized Water Reactors (PWR) nuclear plants existing in the world with a power of more than 1,000 megawatts, five have already undergone shutdowns due to technical problems and all present very low load factors (real yield).

"KWU, the only company to have three plants of that size also has the Unterweser which went into operation in November 1979 and had a yield of 69.4 percent, the best ever recorded for a unit of that size in the world. But that is merely incidental; nothing indicates that they will be able to repeat that feat because variations in yield only attest to the fact that nuclear technology has not been completely mastered."

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MME DOCUMENT VIEWS POSSIBILITY OF URANIUM SALES ABROAD

Sao Paulo FOLHA DE SAO PAULO in Portuguese 20 Apr 81 p 7

[Text] Brasilia--After taking care of its domestic demand stemming from implementation of the nuclear program, Brazil may have "enough uranium to take care of possible external demand dependent on strategic advisability."

That information is included in the Brazilian mineral model prepared by the Ministry of Mines and Energy (MME) according to which, in addition to taking care of the domestic demand that will be created by the installation of the nine nuclear plants, "the production and beneficiation of uranium will eventually make it possible to find world market demand inasmuch as the energy crisis will lead the great majority of the industrialized countries to speed up and increase recourse to nuclear power.

According to the MME document, the world demand for uranium, presently estimated at 30,000 tons, will triple in 1990, reaching 90,000 tons. Thus, the document shows, part of that demand could be taken care of by Brazilian reserves, which are increasing. At the present time, measured uranium reserves amount to 236,300 tons, 122,500 tons of which are located in Itataia in Ceara; 48,000 tons in Lagoa Real in Bahia; 26,800 tons in Pocos de Caldas; 15,000 tons in the Iron-Bearing Quadrilateral; 10,000 tons in Espinharas in Pernambuco; 8,000 tons in Figueira in Parana; and 6,000 tons in Amorinopolis and Campos Belos in Goias.

According to the MME document, "In addition to those reserves, NUCLEBRAS continues the work of prospecting and exploration, selection and checking of areas in various regions, conducting prospecting in Sao Mateus do Sul, Sao Francisco, Triunfo (in Parana; Cerro do Bulao, Cerro Partido (in Rio Grande do Sul); Lagon Real (Bahia); Rio Preto, Campos Belos, Ipora, Amorinopolis (Goias); Serido (in Rio Grande do Norte); Rio Groairas and Itatira (in Ceara); Gandarela and the Pocos de Caldas plateau (Minas Gerais)."

At the present time, a project is underway in Pocos de Caldas that in 1983 should produce 550 tons of uranium in the form of ammonium diuranate and 275 tons of calcium molybdate. That project will begin this year with a production of 150 tons increasing to 450 tons by next year. It is also planned to establish a project for the production of uranium and phosphates (they are associated) in a ratio of 1 ton of uranium to 100 tons of phosphate. That project will be concluded in 1985. The mineral model notes that the world price of uranium is around \$32 a pound, which is equivalent to 70,000 cruzeiros a ton. After it is beneficiated, the value of the uranium increases at least five times.

BRAZIL

CNE MEMBER URGES LIMITING NUCLEAR PROGRAM, OTHER COMMENTS

Celestino Rodrigues Statement

Rio de Janeiro O GLOBO in Portuguese 7 Apr 81 p 33

[Text] Engineer Eduardo Celestino Rodrigues, member of the National Energy Commission (CNE), admitted yesterday during the Second Brazilian Energy Congress that he is in favor of Brazil stopping at only one or two nuclear plants instead of proceeding with its program with Germany.

The statement, made during a roundtable on the Brazilian energy program, immediately aroused a proposal by engineer Frederico Gomes of the Engineering Club to approve a recommendation to the government to halt the nuclear program. When the proposal was already being submitted to a vote (the majority was in favor of cancellation of the agreement) several speakers objected to the idea of such a quick vote. Celestino Rodrigues, who was conducting the proceedings ended up by turning over the floor to other speakers and finally, a recommendation was approved for "the government to adapt the nuclear agreement to the national situation."

Aghast

Celestino Rodrigues said that he was quite at ease in criticizing the nuclear program, especially because he is the representative of private enterprise in the National Energy Commission.

"I believe we should stop at one or two plants. The rest of the funds would be directed toward other energy alternatives. The technology that Germany is transferring to us is the same at Westinghouse's. And from what I know, the Germans obtained that technology without contracting for eight plants. I am aghast at the high prices we are paying," he added.

At the same roundtable, economist Adirson Gomes, of the Federal University of Rio de Janeiro post-graduate engineering course coordinating department, said that the energy program is being turned toward internationalization. He cited the participation of the French Elf Aquitaine company in the production of alcohol for exporting purposes together with the Brazilian Petroleum Corporation (PETROBRAS).

He said that the exploitation of shale will shortly be carried out with Japanese capital, now being followed by the entry of foreign companies in the exploration of areas adjacent to the Campos Basin. Adirson believes that that policy is dangerous because it is conveying resources responsible for the very survival of the country.

Refuses Comment

Rio de Janeiro GAZETA MERCANTIL in Portuguese 15 Apr 81 p 12

[Text] Sao Paulo--Professor Eduardo Celestino Rodrigues, chairman of the Planning Secretariat (SEPLAN) Energy Commission (CSE) and secretary general of the National Energy Commission (CNE), yesterday refused to comment on the reports about limiting the Brazilian-German nuclear agreement.

"What I had to say I already said in Rio at the Second Brazilian Energy Congress," he declared. (At the second congress, the professor advocated and even signed a motion to that effect, approved by 152 votes to 12, halting the nuclear program at three plants.) The justification was that the country did not have the money to take care of a project of that nature. He regretted that the nuclear program alone has a budget of 108 billion cruzeiros while the other alternative energy projects together have 85 billion cruzeiros.

"I do not want to talk about the subject any more in order not to create any tension. I prefer to continue to cultivate my old habit when I see something wrong, even outside of my purview, of putting it down on paper and forwarding it to the appropriate person."

After that, speaking about the energy mobilization plan, he said that all projects in the area should be in keeping with the lack of domestic savings. And he added: "Everything that can be postponed should be postponed."

NUCLEBRAS Defends Agreement

Rio de Janeiro O GLOBO in Portuguese 9 Apr 81 p 29

[Text] Witold Lepecki, a NUCLEBRAS Engineering Corporation (NUCLEN) technician, told the Second Brazilian Energy Congress yesterday that contrary to what is believed, discussion of the nuclear agreement with Germany had the broad participation of private enterprise. That participation occurred even before the signing of the agreement, when the government took a survey of more than 200 national companies that had the possibility of building nuclear equipment.

Lepecki's statement was in response to the director of the PROMON Technological Center, Sergio Trindade, who shortly before had said that the government had a policy of disregarding the experience of national enterprise in agreements of that nature. The NUCLEN technician did not want to identify himself to the press and in view of the insistence of the reporters, he finally left the place. His name was supplied later by some colleagues who said they did not see any reason for him to conceal his identity.

Punching Bag

At the beginning of his presentation, the NUCLEBRAS specialist said that he was very ill at ease in speaking in the congress because the "nuclear program has become a punching bag."

Even before it signed the agreement with Germany, the government surveyed more than 200 companies in a position to manufacture equipment and discussed the subject intensively, including with the Brazilian Association for the Development of Basic Industry (ABDI).

Witold Lepecki said that among the beneficiaries of that government behavior are companies like Bardela, Cobrasma and Confab. He pointed out that a delegation of industrialists was even present at the signing ceremony of the agreement. In addition, he stressed, the government created the Brazilian Nuclear Quality Institute, selecting a representative of the private sector to be its president.

Barriers

In the talk he gave earlier, the director of PROMON, Sergio Trindade, said that the penetration of a new technology in Brazil faces many barriers, among them those of a political, institutional, financial, economic and even psychological nature.

"There is a need for the involvement of the private sector in the agreements into which the government enters. And that participation must be effected from the beginning of the discussion of those agreements in order that the experience of the national companies may be utilized.

Isolated Solution

Professor Flavio Grynspan of the Federal University of Rio de Janeiro (COPPE) post-graduate engineering course program coordinating department, maintained that there is a lack of an integrated policy in the energy area. For example, one cannot transfer the demand for highway transportation to the railroads without thinking of a greater need for electricity. He maintained that purely and simply replacing oil with other alternative sources only benefits the urban population.

The plenary session became excited when Professor Celso Bottura of the State University of Campinas (UNICAMP) declared that neither university research nor its human resources are being utilized.

Agreement Will Be Fulfilled

Rio de Janeiro GAZETA MERCANTIL in Portuguese 10 Apr 81 p 10

[Report by Eimar Magalhaes from Mariana]

[Text] In an interview yesterday, shortly after having opened the Second Meeting of Mining Municipalities of Minas Gerais in the historic city of Mariana, Mines and Energy Minister Cesar Cals pledged that the nuclear agreement will be fulfilled and the nine plants envisaged in it will be built. With conviction and even a little irritation because of the insistence on questions pertaining to the Brazilian-German agreement, Cals said that "Brazil will keep its word" and he observed that that procedure is "a way of retaining the country's credibility vis-a-vis friendly countries," referring to the countries that are participating in the program.

He did not want to make any further comment on the statements by the secretary general of the National Energy Commission (CNE) and chairman of the SEPLAN Energy Commission, Professor Celentino Rodrigues, who advocated "adapting the nuclear

agreement to the Brazilian situation." According to the minister of mines and energy, "that is a purely personal opinion and does not reflect the position of the Figueiredo government." Cals made it a point to explain that the ministers are the spokesmen of the president. He observed that "the Brazilian nuclear policy has been determined and the agreement will be fulfilled."

Certain of that, he had announced a few minutes earlier in a talk to an audience of about 150 persons that the first plant at Angra dos Reis, with a capacity of 600 megawatts of power, will begin operations next August. He added that the other eight units--four of them with sites already determined (two in Angra dos Reis and two in Sao Paulo) will have 800 megawatts of power each and will meet scheduled timetables.

The minister also justified to the audience the need for Brazil to enter into the nuclear age. He declared that even though it has a potential of 200 million kilowatts of electric energy in its rivers, the country is not in a position to utilize all of the available hydraulic energy.

"Half of our potential is in the Amazon, part of it in rivers difficult or even impossible of access. The demand in the energy sector has been increasing 12 percent per year, which means the need to double our generating capacity every 6 years," he concluded.

The Influence of the Crisis

Physicist Jose Goldemberg, president of the Brazilian Society for the Advancement of Science (SBPC) and the professor in the Physics Institute of the University of Sao Paulo, said yesterday that "the current economic crisis must have influenced the thinking of some men in the government, who are already talking about revising our nuclear program, which is very costly and poorly justified."

Goldemberg, who made that comment with reference to the statements of Professor Eduardo Celestino Rodrigues, said that "the basic problem of the energy crisis in the country is not one of electricity.

"Our problem is with oil and its byproducts, which nuclear energy is not in a position to replace. Our hydroelectric program is going very well and if the atomic program is changed--at least from the way it is being conducted--it will be a plus for Brazil," Goldemberg said, according to the AGENCIA GLOBO.

According to him, "the discussion of the problems of the nuclear agreement by the scientists must have influenced the government." Goldemberg expressed hope that, in the event there is a change in the nuclear program, "the scientific sectors that were left out in 1975 when the first agreement was signed will be consulted and utilized."

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BRAZIL

DISCUSSION OF CTA FAST-BREEDER REACTOR PROJECTS UNDERWAY

Rio de Janeiro O GLOBO in Portuguese 7 Apr 81 p 33

[Text] The chief of the division of advanced studies of the Aerospace Technical Center (CTA), Col Jose Alberto de Amarante, said in an interview yesterday that within the next 20 years, Brazil will have incorporated all nuclear technology into its scientific know-how, not only with reference to thermal reactors but fast-breeder reactors as well. As a result, there will be enough energy for more than 9,000 years, considering Brazil's uranium and thorium potential.

He supported the need for Brazil to develop the various lines of the nuclear cycle for nuclear reactors through its own independent projects, but without neglecting the technical collaboration of foreigners. Colonel Amarante revealed that the CTA already has a data center containing all the necessary information on the subject. We are in a position to pass it on to any institution in the country that may be interested, he said.

Fast-Breeder Reactor

Jose Alberto Amarante said that whereas the nuclear program with Germany deals with the technology of thermal reactors, the CTA is conducting projects directed at fast-breeder reactors, the study of which is underway throughout the world. At present, the CTA is making an evaluation regarding fast-breeder reactors in terms of the fuel cycle. That evaluation will be concluded in 1 or 2 years. After that, the phase to be surmounted pertains to the development of an experimental reactor, the implementation of which may require 5 years. According to the scientist, the next phase would be the construction of a commercial reactor, which would be ready by the year 2000.

At one of the technical meetings held during the first day of the [Second Brazilian Energy] Congress, Jose Alberto Amarante was asked about the great technical development achieved by the country in the aerospace area by its own effort, while to gain nuclear technology, it was necessary to have a million-dollar agreement with Germany. He explained that the aerospace program is being conducted without any pressure of time and in accordance with available resources. The nuclear program, however, is linked to the energy needs for a given period, which requires a timetable and, therefore, a lot of pressure. In addition, he stressed, the nuclear program is subject to the problem of emotionalism.

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KWU SPOKESMAN SAYS ANGRA-2, -3 TIMETABLE ON SCHEDULE

Rio de Janeiro GAZETA MERCANTIL in Portuguese 15 Apr 81 p 12

[Report by Paulo Ludmer from Sao Paulo]

[Text] After the 2-year delay in the Brazilian nuclear program caused by the need for more piles in the foundations of Angra-2, "everything is going according to schedule and Angra-2 and -3 will operate in 1987 and 1988, respectively," the spokesman of Kraftwerk Union (KWU), Wolfgang Breyer, assured this newspaper.

"We have not yet signed supply contracts for Peruibe-1 and -2 in the state of Sao Paulo but we will negotiate that before the end of the year," he reported. "In 1984, we will begin construction of Peruibe-1, according to the program, and Peruibe-2 18 months later. That interval between the two projects is due to maximizing the utilization of the common project bed, without troublesome snags in the activities," he explained.

He revealed that for the remaining four plants, KWU has contracts only for the engineering related to the manufacture of the heavy components that are in charge of the NUCLEBRAS Heavy Equipment Corporation (NUCLEP). Above all, KWU believes that by 1995 all eight nuclear plants will be in operation "according to the information constantly exchanged with NUCLEBRAS and the Brazilian Government."

According to Breyer, NUCLEBRAS' 1981 budget of 108 cruzeiros "is enough for the pace of the program." He explained that the state payments to the Germans continue to be punctual and that the imports of the program are being paid to the financing foreign banks.

The spokesman did not know how much a nuclear-electric kilowatt would cost in Brazil. But he revealed that in Germany, for the same plant normally delivered on a "key-in-hand" basis, with the time period and price preestablished by contract, the price amounts to \$900 per kilowatt, considering only the direct costs and excluding the indirect and financing costs. The establishment of the NUCLEBRAS Nuclear Plant Construction Corporation (NUCON) subsidiary will now permit delivery to the operating electric power concessionaire in Brazil on a "key-in-hand" basis, according to Breyer ("so far only Furnas knows how much an installed kilowatt costs"). In Germany also, he pointed out, a plant identical to the Angra plants (1,200 megawatts) costs 2.5 billion marks.

The KWU does not accept "aimple" comparisons between an installed nuclear electric kilowatt and a hydroelectric kilowatt because: 1) nuclear energy is basic and has to be compared with 50 percent of the hydroelectric power, which is the factor used in Brazil to compare the two; and 2) nuclear electricity requires a comparison that takes into account the kilometers of transmission lines. These plants are close to consumer centers. In the case of Itaipu, the transmission lines will cost almost 70 or 80 percent of the generating plant.

Charges

Breyer rejected the charges that "the technological progress underway in the KWU PWR reactors will not be completely transferred to Brazil." He said: "All technological advances made will be passed on to Brazil. It is even probable that the eighth reactor will include some improvements, but not too great, compared to the first one supplied."

He explained that "that reactor is not undergoing rapid changes. On the contrary, KWU is standardizing it to facilitate its licensing and construction, since 1975, when it was developed. We are in the phase of licensing a group of those reactors in Germany, which we call a train, identical to those of Angra-2 and -3. And the days of the PWR will be very short, since they are destined to be replaced by the fast breeders and by the Helium-Cooled High Temperature (HTR) reactors, for us to be thinking of incorporating substantive changes."

KWU especially rejected the criticism made by the physics professor of the Federal University of Rio Grande do Sul, Alfredo Aveline (see below). The company disagrees that the load factor shows comparative technical qualities of the plants. He pointed out that in 1980, Biblis-A had a load factor of 39 percent; Biblis-B, 52 percent; and Unterweser, 86 percent. However, he explained it as follows: "Between autumn of 1979 and the first half of 1980, the two Biblis plants operated at reduced power because they did not yet have the available facilities to stock the spent fuel, which is renewed at the rate of one-third every year. The reason for that was that there was a delay before the operating concessionaire, RWE, could build a compact storage facility in the reactor premises, increasing its capacity to store radioactive material, which is reprocessable owing to its uranium and plutonium content."

Breyer explained that "licensing for that was delayed for political and not technical reasons." He said that in the future another way may be used to transform those leftovers; "it is even being thought about contracting Cogema, the French state enterprise."

Statistics

In any case, KWU indicates that the quality of atomic plants is measured by the rate of availability (time available for production) and by the rate of work (what percentage of the power is utilized in the available time).

And his statistics place it in a favorable position, at least those shown by Breyer. The rates of availability of KWU's PWR plants are 10 percent above the world average, from 1969 to 1980; that is, they are close to 76.9 percent, considering the work rate normally 1 to 3 percent lower than the rate of availability. His average load factors are 78.7 percent, while the world average of all builders is 65.8 percent.

Finally, on the political level, Wolfgang Breyer refuted Aveline, arguing that:

- 1) In the NUCLEBRAS Engineering Corporation (NUCLEN), KWU controls only 25 percent; in the NUCLEBRAS Heavy Equipment Corporation (NUCLEP), Voest-Alpine/GHH hold only 25 percent; and in the NUCLEBRAS Isotopic Enrichment Corporation (NUCLEI), Steag hold 15 percent and Interatom/KWU, another 10 percent. In other words, in the three cases, the Germans named the technical managers to implement and facilitate the transfer of technology, with the possibility of their votes being defeated;
- 2) in NUCLEN, the German technicians make recommendations that may or may not be accepted. Their functions are to guarantee the technical quality of the project and the operation of the plant to its customer, Brazil and the world. In that case, there are responsibilities for "guarantee and warranty contracts." The German group protects the interests of KWU if the Brazilian side takes a wrong technical action. By not accepting such decisions, by contract KWU relieves itself of the responsibility and the consequences stemming therefrom. However, there was never such a case with reference to Brazil; and
- 3) KWU submits to the licensing rules at the same time that Brazilian sovereignty is safeguarded.

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BRAZIL

ANGRA I WILL GO INTO OPERATION ONLY AFTER 205 TESTS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Apr 81 p 25

[Text] Loading of the Angra I reactor core will depend on the solution of 20 planning problems, the conclusion of 20 inspection reports indicating several deficiencies have been eliminated, the accomplishment of 150 preoperational tests and the licensing, already underway, of 15 operators. Making this statement yesterday in Rio, Engineer Claudio Almeida of the National Nuclear Energy Commission (CNEN) reactor department, said that after all these phases have been complied with, there will still remain another 55 starting tests after the loading of fuel in the core. He said that FURNAS [Brazilian Powerplants], which is responsible for the operation of the powerplant, is promising to satisfy all requirements by next 14 June so that on 6 July it can begin loading the core, an operation lasting 6 days.

The engineer explained that throughout the Final Analysis Report (RFAS) 415 questions were asked, of which 387 were answered, with 28 remaining to be explained. A coordinating office and seven groups in the CNEN are working on that report. The majority of the questions not answered--16 of them--are being handled by the electrical engineering group, followed by seven questions for the mechanical engineering group. The smallest number--one--went to the radiological protection group.

Turbine

During the excavations for the placing of the Angra II pilings, the site of the Angra I turbine suffered an inclination of some millimeters. The engineer reported that the movement was stabilized by means of an impermeable wall between the two powerplants. After that measure was taken, some adjustments in the support mounts were made, obtaining the necessary alignment of the axle. The CNEN required that FURNAS, the builder of Angra I, keep up a program of measuring the level of the turbine site, which has already been tested at a speed of 1,800 rotations per minute without showing any problems of vibration because if it had, it would have been completely damaged, according to Claudio Almeida.

The engineer said that the measuring of the level of the site will be done until there is the absolute assurance that it will remain level. The turbine was tested for 2 months but it only rotated for some hours. When the plant begins operations, the turbine should operate for 24 consecutive hours. Among the 150 preoperational tests, one was that of the turbine. Of that total, 40 were already approved by the CNEN, while eight are under evaluation and 30 are under way. The axle of the turbogenerator, which is divided into three parts, runs five sections: a high pressure and two low pressure turbines, one electric generator and one regulator. The three axles (60 meters long) will be precisely aligned by means of journal bearings which are supported by the turbine site.

Burned Out

The transformer which was burned out during the cold test--or electronic tests--is already being reinstalled and should undergo new tests in the presence of CNEN technicians, according to Claudio Almeida.

With respect to the two pumps of the water circulation system which also had some defect during the tests--one of them was repaired in the United States--he said that one has already been installed and tested, the results of the tests not being known yet. The engineer said the other pump is being installed.

With respect to Angra II, the CNEN, according to the engineer, has not yet granted the final license for the construction of buildings. There is only the license for the foundations, which are in the completion stage. The license for the sites will be granted when the status of NUCON [Brazilian Nuclear Corporations Construction] is completely defined with a social reason for existing. Claudio Almeida said that even a change in legislation is being discussed because, according to the specific law in existence, only electric companies may build nuclear powerplants.

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BRAZIL

CONTRACTING BEGINS FOR NEW NUCLEAR PLANT EQUIPMENT

Rio de Janeiro O GLOBO in Portuguese 8 May 81 p 20

[Text] Yesterday NUCLEBRAS [Brazilian Nuclear Corporations] began contracting for equipment for nuclear powerplants IV and V, which will be located in Sao Paulo. The orders, whose total value is 92.4 million cruzeiros, are to private national companies Vibasa and Eletrometal.

The director of NUCLEBRAS, Nei Freire, said that in view of delays in the nuclear program, the share of nationally-built equipment should increase. Therefore, excluding the civil projects, which are completely built by Brazilian companies, the share of nationally-built equipment of the powerplants is as follows: Angra I, 8 percent; Angra II and Angra III, 35 percent; Angra IV and Angra V, 65 percent national equipment.

According to Nei Freire, in coming months it will be decided whether powerplants IV and V will be located in the Sao Paulo municipalities of Peruibe or Iguape. Still yesterday, NUCLEBRAS signed a contract with the Navy for 140 million cruzeiros for the accomplishment of hydrographic studies along the Sao Paulo coast.

The entry of Brazilian nuclear powerplants into operation is as follows: Angra I (prior to the Brazil-German nuclear program) begins its tests in coming months; Angra II begins operations in 1987; Angra III, 1988; Powerplants IV and V will begin operations in 1990.

Sites

Nei Freire declared that up to now NUCLEBRAS has already designated an area of 235 square kilometers for the installation of the two new powerplants (IV and V), but the exact site depends on various studies. He said that the type of soil will not be a basic factor for the choice of the site but many other conditions such as the ease of obtaining and returning water from the ocean, ecological conditions, and so forth, will be. The construction of powerplant IV will begin in 1983.

He revealed that the courts accepted all requests for expropriation of the areas in the environs of Peruibe and Iguape, but that approval is still lacking because of questions posed by the owners.

Nationally-Built Equipment

With respect to the increase in nationally-built equipment made possible by the delays in the program, he reported that NUCLEP [NUCLEBRAS Heavy Equipment, Inc.] will be able to make collectors and pressurizers, which according to the initial agreement were to be provided by the German firm KWU.

The director of NUCLEBRAS said that he could not give details on prices of the new powerplants but said that this year alone NUCLEBRAS will spend 5 billion cruzeiros on powerplants IV and V.

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BRAZIL

BRITISH FIRM TO SUPPLY ENRICHED URANIUM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Apr 81 p 31

[Article by Paulo Andreoli: "Transfer is the End of the Impasse"]

[Text] URENCO (a German, British and Dutch consortium) found a solution for the impasse created by the Dutch Parliament, which sought to veto the supplying of enriched uranium to Brazil. The order for supplies made by Brazil to URENCO in 1977 will now be filled by the British company associated with the consortium, British Nuclear Fuels Ltd., which will be able to obtain an export license for enriched uranium without any difficulty.

Supplies of enriched uranium by URENCO were negotiated between Brazil and the FRG during the Germany-Brazilian agreement signed in 1975. With the development of the Brazilian nuclear program and with the actual placing of orders for supplies in 1977, problems began to appear. The supply of enriched uranium by URENCO in Holland was scheduled but the parliament of that country created several obstacles with the argument that Brazil was one of the few countries which had not signed the Nuclear Nonproliferation Treaty.

Brazilian diplomatic authorities believe that nuclear nonproliferation should be considered vertically as well as horizontally, that is, nonproliferation means the nontransfer of technology and fissionable material from one country to another and also--something important--it also means no domestic development or increase by those countries having nuclear technology of nuclear military devices "for nonpeaceful means." If the transfer of nuclear technology among countries represents a danger, the arms race and the vertical development of nuclear military devices, as far as Brazilian authorities are concerned, all present a serious danger.

As far as Brazil is concerned, it matters little what the origin of the enriched uranium is, whether it comes from Holland or England. What is actually of interest is that enriched uranium supplies be regular to guarantee the uninterrupted operation of the nuclear powerplants. The decision announced yesterday in The Hague, Holland, could have even been deferred, since with the delays in the Brazilian nuclear program it is becoming more and more difficult to even say when the country will need enriched uranium. Not even the first Brazilian nuclear powerplant (Angra I), purchased from Westinghouse and whose construction began around 1966, has yet gone into operation.

FAST BREEDER TECHNOLOGY TO BE NEGOTIATED WITH FRANCE

Rio de Janeiro O GLOBO in Portuguese 6 May 81 p 20

[Text] Sao Paulo (O GLOBO)--Minister of Mines and Energy Cesar Cals confirmed yesterday during the "Great Carajas Meeting" that Brazil is in the final phase of negotiations for the signing of a new nuclear agreement with a foreign country for the purchase of fast breeder reactor technology. He pointed out that the intention is not that of building new nuclear powerplants "but only of developing an advanced technology in the nuclear sector."

Although the minister refused to reveal the country with which the agreement is to be signed "because the deal has not yet been made," businessman Antonio Ermirio de Moraes, also present at the meeting, said he believes the foreign partner has to be France because it is a country which even has a fast breeder being installed, the "Super Pheonix." Another reason which may justify partnership with France was the visit made recently by President Joao Figueiredo to the French nuclear powerplants.

As Minister Cesar Cals explained, the new agreement--which foresees the installation of experimental fast breeder reactors--is independent of the Brazil-Germany accord, which will continue with the installation of eight powerplants with PWR (Pressurized Water Reactor) reactors. The greatest advantage of the fast breeders over the PWR reactors is that their yield in terms of uranium consumption, is much greater.

Another advantage of the fast breeder, as explained by Antonio Ermirio de Moraes, is its ability to use different types of fuel, being able to use uranium as well as thorium "and surely Brazil has one of the greatest thorium reserves in the world," added the businessman.

Fast Breeder Reactors

France has been leading in research for the development of fast breeder reactor technology. Germany and Italy also participated in the French program of building the Super Pheonix fast breeder reactor with a 25-percent share each.

Fast breeders use plutonium as part of their fuel, an artificial, highly radioactive element, which is produced in the nuclear reactors installed in Brazil pursuant to the Brazil-German nuclear agreement (Angra I, II and III, for example).

Light water reactors contained in the nuclear agreement, with technology developed mainly in West Germany, use enriched uranium 238, producing electrical energy with turbines activated by pressurized water [as published]. This process of nuclear fission leaves plutonium as a waste. Plutonium in turn cannot be used at this time and because it is highly radioactive is placed in special atomic waste dumps. Fast breeder reactors could use part of that plutonium, which is an artificial element not existing in nature.

Technicians believe, however, the reactors will only begin operating on a commercial scale in about 25 years.

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BRAZIL

BRIEFS

BRAZILIAN-GERMAN TALKS--Brasilia--Brazilian and German experts from different sectors spent yesterday in the Foreign Ministry discussing forms of cooperation in the solar and wind energy areas, the exchange of scientists, data processing and quality control. With reference to the nuclear agreement between the two countries, only the part dealing with the training of personnel was discussed, according to Foreign Ministry, Mines and Energy and German Embassy sources yesterday afternoon. "A revision of the nuclear program can only be negotiated at another level and in another way," declared a Ministry of Mines and Energy source. Gerhard Kutzner, the German Embassy spokesman, agreed with that information. According to him, the German-Brazilian Scientific and Technological Cooperation Commission, which meets annually, does not have the power to revise the agreement. "They are making an annual evaluation of the various cooperation projects in the scientific area which the two countries maintain," Kutzner said. According to a report released today by the Foreign Ministry, the two delegations are analyzing the possibility of cooperation in the fields of "solar and wind energy, remote sensing, mathematics and data processing," among others. [Rio de Janeiro GAZETA MERCANTIL in Portuguese 1 Apr 81 p 9] 8711

YELLOW-CAKE PRODUCTION--Rio--NUCLEBRAS Director of Mineral Exploration, John Forman, revealed that the yellow-cake producing plant that is being installed in Pocos de Caldas (Minas Gerais) with technology from the French Pechiney Company will not begin producing until the second half of the year. The plant's yellow-cake production capacity will be 500 tons per year; this year it will produce about 45 tons per month. All of the uranium supplies for the Pocos de Caldas project will come from a 46,000 ton reserve. According to Forman, 26,000 tons will be from the Planalto (plateau) in Goiaz and 20,000 tons from the Pocos de Caldas area. The total investment by NUCLEBRAS this year in mineral exploration will be 1 billion cruzeiros. [Rio de Janeiro GAZETA MERCANTIL in Portuguese 31 Mar 81 p 12] 8711

THIRD SAO PAULO PLANT--Aracatuba--The president of the Brazilian Electric Power Corporation (ELETROBRAS) and director general of Itaipu Binational, General Costa Cavalcanti, acknowledged yesterday that "depending on the needs of the market and the construction facilities in the Parana region, where two nuclear plants will be built, a third nuclear power plant may be installed." Costa Cavalcanti observed also that "there are no longer any doubts about the installation of plants 4 and 5 on the southern coast of Sao Paulo." Although he stressed that nuclear power station projects are the exclusive purview of NUCLEBRAS--ELETROBRAS is

responsible for only the Angra-1 plant--Costa Cavalcanti said that the two companies are jointly examining the studies on siting, programming and entry into operation of the other nuclear plants envisaged in the Brazilian-German agreement. These studies conducted by ELETROBRAS and NUCLEBRAS are part of Plan 2000, a plan that spells out the country's entire energy policy for the coming years, which will be presented to President Joao Figueiredo in July. According to Costa Cavalcanti, Plan 2000 will give special attention to the programs for interlinking the national electric energy transmission systems which, according to Costa Cavalcanti, "was not done perfectly in previous plans." "We are also going to pay attention to the regionalization of the energy producing sources, with small and more widespread generation sources," concluded the president of ELETROBRAS. [Rio de Janeiro O GLOBO in Portuguese 26 Apr 81 p 32] 8711

NINE PLANTS IN 2000--Brasilia--Miner and Energy Minister Cesar Cals yesterday confirmed a report that appeared in the ESTADO DE SAO PAULO last September, that the nine plants of the Brazilian nuclear program will not be operating until the year 2000, and that fact will be included officially for the first time in the so-called Plan 2000, which was not presented to the government yesterday by the management of ELETROBRAS, as had been scheduled. The company requested 2 more months "of preparation," according to the minister, in order for the technicians to review the whole previous programming of Plan 95 "more calmly." According to Cesar Cals, there are still problems with regard to establishing coal as "one of the highest priorities of our energy program," questions pertaining to implementation of the Carajas Project, and the timetable of hydroelectric plant projects, "which was reviewed by officials in that sector." [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 15 Apr 81 p 35] 8711

ANGRA NUCLEAR PLANT--Brasilia (O GLOBO)--Emilio Leme, president of NUCLEBRAS [Brazilian Nuclear Corporation] Nuclear Plants Building Company (NUCON) has stated that the cost of an installed kilowatt from the Angra II and Angra III nuclear plants will be \$1,500, excluding the financial costs. These predictions made by the president of NUCON, an enterprise created in October 1980 to assume the state monopoly of handling management of the construction of nuclear plants in the country, represent a considerable reduction in relation to the predictions made by Furnas, the enterprise which, before the creation of NUCON, had been responsible for the construction of Angra II and Angra III. Leme stated the NUCON cannot work without having complete control over the timetable and costs of the project. He stated: "As of now, any delay in the construction of the nuclear plants will be NUCON's responsibility. Therefore, every one knows who to blame for these possible delays." [Excerpts] [PY281357 Rio de Janeiro O GLOBO in Portuguese 27 May 81 p 19]

ANGRA PLANT DELAYED AGAIN--Scheduled to go in operation early in July after several delays, the Angra 1 nuclear plant will once again postpone its operation because problems sprang up in two of three pumps in the secondary circuit and the water system. One of these pumps was defective and it was returned to the manufacturer in the United States. In addition, a transformer burned out and the turbogenerator is in danger because the building housing it has sunk 20 millimeters, twice as much as tolerance permits. The latter problem was caused by the lowering of the ground water level after excavations were made to place foundation piles for Angra 2. The information was given by Furnas Electric Company in Rio de Janeiro yesterday and by other sources in the sector. [Excerpt] [PY120100 - Paulo O ESTADO DE SAO PAULO in Portuguese 9 May 81 p 1]

LOAN FROM KfW--While President Joao Figueiredo was meeting with German politicians at Gynntch Castle yesterday, Planning Minister Delfim Neto signed a \$70 million loan agreement for Nuclebras with the Kreditanstalt Fur Wiederaufbau (KfW) in Frankfurt. The loan, which had already been announced by Minister Neto the last time he visited Germany, brought to nearly \$1 billion the total invested by the KfW in the Brazilian nuclear program. Although it was scheduled, Neto did not meet with FRG Economics Minister Otto Graf Lambadorff. [Excerpt] [Rio de Janeiro JORNAL DO BRASIL in Portuguese 20 May 81 p 4]

URANIUM RESERVES--General Costa Cavalcanti, Nuclebras president, has revealed that Brazil's uranium reserves amount to 250,000 tons. This reserve is considered enough to supply from 35 to 40 nuclear plants of 1,200 MW for their lifetime. [Sao Paulo FOLHA DE SAO PAULO in Portuguese 14 May 81 p 27]

NUCLEAR PROGRAM DELAYS--Nel Freire, the director of NUCLEBRAS [Brazilian Nuclear Corporations], announced yesterday that by the end of May the new time periods and costs for the construction of Angra II and Angra III powerplants will be revealed. According to the FURNAS [Brazilian Powerplants] timetable, each of the powerplants will cost \$1.68 billion and Angra II will be ready in 1987 and Angra III in 1988. Nuclear sector sources admit that the new timetable should establish a minimum delay of one year for conclusion of the two powerplants and increases of no less than 20 percent in construction costs (in dollars). Those sources explain that in many contracts there were delays of 2 years in the signing of them and that in view of that, a delay of one year in the conclusion of the work is a conservative figure. Due to the lack of resources which has been affecting FURNAS, that company proposes unacceptable contracts to suppliers with clauses withholding part of payments and their payment without monetary correction. On 1 April, FURNAS passed on to NUCLEBRAS (NUCON) the task of building nuclear powerplants and in less than 30 days NUCON signed the first contracts for the supply of parts valued at 2 billion cruzeiros with the Sulzer Wiese, Confab, Cebec, Aflon and Cobrasma Companies. According to the initial timetable, those contracts should have been signed 2 years ago. NUCLEBRAS has until 31 July to announce the new time periods and the costs of the powerplants but should still do it this month. [Text] [Rio de Janeiro O GLOBO in Portuguese 1 May 81 p 16] 8908

URANIUM CONCENTRATES EXPORTED--Brasilia--NUCLEBRAS (Brazilian Nuclear Corporation) will be able to begin systematically exporting uranium concentrates if the government decides to do so. Brazilian proven reserves, at today's rate, are worth \$15 billion. NUCLEBRAS' readiness to export uranium, in the event the government decides in favor of this, takes into account the fact that the proven reserves of 236,000 tons exceed that necessary for the current nuclear program. This amount of uranium is enough to feed 40 Angra II reactors for all their useful lives. [Excerpt] [PY292115 Rio de Janeiro JORNAL DO BRASIL in Portuguese 28 May 81 p 19]

CSO: 5100/2266

COLOMBIA

BRIEFS

POSSIBLE URANIUM RESERVES--Ernesto Villareal Silva, director of the Institute of Nuclear Affairs, has said that, in the course of a program carried out in 1980 to assess international uranium resources, it was determined that Colombia has possible uranium reserves of 40,000 tons, which could provide the country with an alternative to oil for generating electrical energy. [Bogota Domestic Service in Spanish 1730 GMT 8 May 81 PA]

CSO: 5100/2255

URANIUM RESERVES BARELY ENOUGH FOR LAGUNA VERDE

Mexico City EL SOL DE MEXICO in Spanish 9 Apr 81 pp 1-A, 14-A

[Article by Elena Gallegos]

[Text] The delay in the construction of the Laguna Verde Nuclear Electric plant and in putting it into service has been so great that by the time it is put into operation "it will be a technological museum."

In addition, the proven uranium reserves the country has are barely enough to supply Laguna Verde during its active life which has been calculated to be 25 years.

Researchers of the Metropolitan Autonomous University, Engineer Jose Arias and Dr Marco Antonio Martinez, concurred on the above during the series of lectures "Nuclear Energy, No Thanks" which was organized by the Unidad Xochimilco [Xochimilco unit] of the University.

Dr Martinez Negrete pointed out that as long as the prevailing electrical consumption pattern remains unchanged, industry will continue to absorb more than 50 percent as compared to 6 percent which goes to agriculture and 15 percent to domestic use.

Expanding on the subject Dr Martinez Negrete stated, "Under these conditions the electric nuclear program will promote the pattern of injustice which now prevails so an energy system should be adopted which is based on clean and renewable sources."

Engineer Jose Arias also pointed out that in industrialized countries opposition to the use of this type of energy (nuclear) grows ever greater and so "the manufacturing companies sell their technology to Third World countries among which India, Brazil, Mexico and Argentina are the most prominent."

Severely criticizing the construction of the Laguna Verde nuclear plant the engineer stated that by the time it is put into operation "it will be a technological museum."

He then emphasized that nuclear energy is expensive and nonrenewable. Its use involves a costly and extensive technology which will increase our dependence even more.

Taking an opposite position, during the same series of lectures the physicists Antonio Gershenson and Antonio Ponce stated: "By the year 2000 it is expected that

the plant at Laguna Verde will produce 20,000 megawatts which, added to 25,000 megawatts from the hydroelectric plant, 8,000 from coal and 5,000 from geothermic sources will add up to a potential of 58,000 megawatts which is still below the demand expected by the end of the century."

Gershenson also referred to the close relationship between the development of energy and the economic development of the country and stated (in defense of the nuclear plants) that the hydroelectric plants have natural limitations since they depend excessively on the fluctuations of rain and drought.

In conclusion, he indicated that the ecological problems stemming from the use of fossil fuels (petroleum, gas and coal) are greater than those from nuclear plants.

9204

CSO: 5100/2232

MEXICO

BRIEFS

URANIUM EXPLOITATION WITH SPAIN--Mexico and Spain are jointly developing a process for the recovery of uranium through the treatment of special sands which will place them ahead of the developed countries in this area, it was disclosed by the National Institute of Nuclear Research. The work has started in different areas of the Republic where experts from both countries are analyzing different sands in order to determine their degree of suitability for the purpose of recovering uranium. At ININ [National Nuclear Research Institute] a communique also reports that it is planned that the joint Spanish-Mexican investment will be 2,400 million pesos this year which will bring the total investment up to 7,200 million. It also mentions the increase in scientific, cultural and commercial relations which have recently taken place and an example cited is the Expotecnica Espana 81 [Spanish Technical Exposition of 1981] which will take place next May. [Text] [Mexico City EL SOL DE MEXICO in Spanish 8 Apr 81 p 3-B] 9204

CSO: 5100/2232

ZAMBIA

BRIEFS

COGEMA PARTICIPATING IN URANIUM PROSPECTING--The General Nuclear Materials Company (COGEMA) of France has officially acquired an interest in uranium prospecting operations in Zambia. The French national company is associated with the Italian firm AGIP SPA [National Italian Oil Company], which signed its second prospecting contract with that country. The new agreement will increase by 200 percent the area of the territory conceded, or about 13,500 square km, in the Northwest Province. AGIP, which has been prospecting in Zambia since 1979, is associated in the southern part of the country with the West German firm Sarberg Interplan and the Japanese PNC [Power and Nuclear Corporation] group. Mufaya Mumbuna, the Zambian minister of Mines, stated that AGIP has already spent \$7.5 million in the last two years. The estimated budget for the AGIP-COGEMA operations for the next two years should be \$12.5 million. [Text] [Paris LE CONTINENT in French 30 Apr 81 p 8] 8946

CSO: 5100/4934

PUBLIC FEARS OF NUCLEAR ENERGY SOOTHED BY GEORGIAN WRITER

Tbilisi KOMUNISTI in Georgian 16 Nov 80 p 3

[Article by Guram Pandzhikidze: "Man, Energy, and the Atom. The Atom in the Service of the People!"]

[Excerpts] Yes, all roads now lead to nuclear power plants!

Now let's see how Georgia stands with regard to the furor about energy.

Many--including, unfortunately, members of the technical intelligentsia--believe that Georgia is among the wealthiest republics with regard to the generation of electricity. Unfortunately, and deplorably, quite the contrary is the case. Our republic is near the bottom in terms of electrification. In recent years, the GCP CC has taken decisive steps in this regard. Just a few days ago we celebrated the start of Inguri GES Unit No 5. Each unit has a capacity of 260,000 kw, but even this does not finally solve the energy problem.

We must state frankly that life itself has raised the question of building a nuclear power plant in Georgia. And, we might add, as soon as possible!

If we do not immediately come to terms with this problem and overcome our lag in the production of electricity, it will have an all-encompassing impact both on the republic's consumer services and on the future development of industry and agriculture.

Many people do not even want to think about nuclear power plants. For some reason, nuclear power frightens and alarms people who have not looked into the situation. At the same time, such people raise loud protests when, for example, there are interruptions in the supply of gasoline, hot water, and heating in Tbilisi.

Are there any grounds for these fears and alarms? The answer is unequivocal--none at all!

The fears are only "semantic."

People often say, What do we want with nuclear power when we have so many hydropower resources? In fact, however, our hydropower picture looks quite different. Even if we were able to build all of the economically feasible hydroelectric power plants by the end of the century--that is, in twenty years' time--in the year 2000 they would

only half of the republic's electricity needs at best.

To shed more light on the problem, let us look at a few figures. It is wrongly thought that figures are a dull and unemotional language. But if we look closely, we find that behind every figure there is a panorama of urgent and unsettling problems which easily convince us of the true emotional content of these figures.

Today, Georgia consumes 11 billion kw of electricity every year, yet much more is needed if we are not to become dependent on gas or other organic fuels brought into the republic from outside. Planning organs estimate that in the year 2000 the republic will need an absolute minimum of 50 to 60 billion kwh. Yet our hydropower resources will provide a maximum of only 25 billion.

We must also keep in mind that our hydroelectric plants generate the maximum power only during the high-water season--that is, in the spring time.

In the summer, autumn, and winter Georgia's hydroelectric plants supply the economy and the public with electricity only for three or four hours.

The operating conditions in the power plants built on Georgia's rivers fluctuate so much that placing all hopes on them is scientifically naive.

Indeed, all roads lead to nuclear power plants.

Earlier I mentioned "semantic" fears.

The fear of nuclear power plants can indeed be classified as a "semantic" fear.

Many industrial projects in Georgia have given rise to the same kind of "semantic" fears. It is thought that Georgia cannot supply big technical enterprises with enough cadres. A particular and rather large segment of the population thinks that Georgia should remain a land of resorts, tourism, light industry, and food production.

Do you recall when Georgian oil gave rise to the same kind of "semantic" fears?

People don't know that the whole Georgian oil industry requires only 6000 men. Yet the Gori Cotton combine already employs more than 6000 workers and weavers, and the Gelati Garment association employs even more.

Many are unaware that serving one tourist or vacationer requires an average of 1.5 workers (whether hotel, postal service, dining facilities, medical care, transport, and other personnel). If the republic were to host a million vacationers all at the same time, serving them would require 1.5 million persons.

Many small countries have already become nothing but nations of hotel personnel and waiters, and a list of examples would be a long one.

Once, an oil well blew up on the Kakheti Highway. The effects of the blast ruined crops on five hectares of land.

It was really a terrible sight.

Certain "grahdstand patriots" immediately seized upon the incident. Hoping to sway naive people, one of them came out with the saying "Shah Abbas himself never visited upon Kakheti the kind of disaster that Georgian oil has."

"Speaking without thinking is the same as firing without aiming," said the great Cervantes. Indeed, firing without aiming often means shooting a friend instead of an enemy.

But what is the situation really? We said before that the oil well explosion completely ruined five hectares of crops. But we should add that the effects lasted only one year, and after that the five hectares went back into full production.

The would be patriot who coined the above slogan does not know that world-wide every year factory construction, erosion, and swamp formation take five to seven million square km of land permanently out of production and in our own republic the arable land area was reduced by 40 percent between 1950 and 1972.

In Akhmeta Rayon alone during that time the Alazani River turned 200 hectares into agriculturally useless land. That should be enough examples.

Some people cry "But nuclear power plants will raise the radiation level and the people will die!"

I am curious as to why such people do not demand that vehicle transport be banned. They should be well aware, after all, that 900 to 950 people die on our republic's highways every year, and five times as many are injured!

Take a good look at that figure: 900 to 950 persons!

Now let's see how "dangerous" nuclear power plants are to the population.

Let's start with the fact that the construction of nuclear plants does not threaten Georgia's valleys and villages with flooding.

Nor do they threaten the Black Sea coast with erosion. Recall how much trouble we have had in the Pitsunda area.

We should also keep in mind that nuclear energy is very clean. Nuclear plants do not pollute the environment in the slightest, while the coefficient of "environmental heat pollution" by oil-fired and coal-fired plants is very high. Moreover, they are being operated with almost no control.

Here's a graphic example. New York is supplied with electricity by the Edison Company. Officials of the company decided to immediately convert the generation of power for New York totally to nuclear, because organic fuel-fired plants had contaminated the environment badly. In the United States generally there are strict

laws governing the use of organic fuels to generate electricity. If the fuel contains more than one percent sulfur, using it to fire power plants is strictly prohibited.

And we have said nothing about the capacity, stability, and versatility of nuclear plants. For example, one average nuclear power plant can supply hot industrial water to a relatively large city or community. Such things already exist in a number of Russia's cities.

So what are we afraid of?

The fear of nuclear power plants is based on the explosion of the atomic bombs that were dropped on Hiroshima and Nagasaki, and on the nuclear radiation that afflicted human beings with horrible diseases for decades.

In short, some people believe that, in the first place, nuclear power plant emissions will raise radiation levels over a wide area and inflict incurable diseases on the population.

Secondly, they fear that an earthquake or some technical malfunction can cause the nuclear power plant to explode. They think that such an explosion would be equivalent to an average-sized atomic bomb.

How realistic are either of these fears?

Let's start with the first one. Would radiation emissions around a nuclear power plant really be dangerous? Here is what Academician M. Stirikovich, honorary vice president of the Executive Committee of the World Energy Conference, has to say:

"These notions come about because people have no clear understanding of relatively simple events. The level of radiation around nuclear power plants differs hardly at all from natural background radiation, a background without which man would not be what he is. As a biological entity, man evolved under continuously active radiation conditions--the sun's radiation (which is not entirely absorbed by the atmosphere) and emissions from radioactive rocks in the earth's crust--that is, man has evolved under definite dosages of radiation, which are normal conditions of human existence.

"I can state firmly that nuclear power plants are the safest of all.

"To date there has not been a single death caused by nuclear plant emissions anywhere in the world. The chance of death from a nuclear power plant accident is 100 times less than death by lightning. The same can be said about the future, when nuclear energy will become even more widespread."

This, I think, puts the matter clearly and understandably. I should like to add that there hasn't even been a case of industrial injury in nuclear plants. This, despite the fact that even a chocolate factory is not free of injuries.

Now about the second danger: Is there a chance that an earthquake or a technological error might cause a nuclear plant to explode, especially an explosion equivalent to an atomic bomb?

Not at all!

Nuclear power plants use "low-grade fuel," and as Academician M. Stirikovich has put it, neither earthly nor divine powers could explode such material.

Academician V. Gomelauri has this to say: "We must state categorically that an atomic explosion in a power plant's thermal reactors is absolutely impossible. Even if anyone intended to do it, he couldn't."

Accidents, however, are not ruled out. There have been two such accidents, one in Yugoslavia and another in the United States. The accident in Yugoslavia took place during an experiment--I repeat, an experiment--and injured four scientists. The accident caused a sharp temporary rise in temperature.

A similar temperature rise in the United States accident did not injure anyone. The people in the vicinity received about as much "excess" radiation as, for example, airline passengers receive in a flight from Moscow to New York. Let us recall that at an elevation of 10 km the radiation is more intense than on the earth's surface.

We do not wish to give the impression that nuclear plants are completely harmless. The weakest link in nuclear plant operation involves atomic "wastes" which continue to emit radiation for a long time.

Neither is this, however, an insoluble problem. First of all, the amount of atomic "waste" is insignificant. Of this small amount, 90 percent consists of elements which in 30 years' time essentially lose all their radioactivity.

The remaining 10 percent is more dangerous. They remain radioactive for a much longer time. Radioactive wastes must be placed in hermetically-sealed containers (not an easy task) and buried in dry shafts or salt mines. Under present conditions, with nuclear power plants playing only a small part, waste disposal is not a difficult matter. But methods are already being worked out to launch radioactive wastes into outer space. This method will become essential once nuclear power plants account for one half or more of the world's energy output.

Specialists estimate that launching atomic wastes into outer space will increase the cost of nuclear energy only slightly.

In other words, the dog's bark may be worse than his bite.

In today's scientific-technical revolution, it is embarrassing for unfounded rumors and misinformation to feed our mentality and shape our views and positions. What we must do is shape correct public opinion concerning today's energy problems.

In countries which do not have their own industry, their own strong working class, their own engineering-technical personnel, their own experts and scientists, the people's intellectual vigor has declined because such nations have lost their original identity, they have lost their national self-consciousness and their cohesive force.

A nation's talent must split the tiniest atom, peer deeply into the mysteries of the microworld.

A nation's talent and energy must explore space and reach for the stars.

A nation's intellect, talent, and love of labor must serve to open new pages in science and create new works of art.

This cannot happen in countries which have transformed themselves into grand hotels and exhausted all of their national energy on them.

Life goes forward at an awesome rate of speed, and any nation which wishes to keep its place in this world cannot afford to fall behind.

Recall what Beethoven said:

"Whatever happens, go forward!"

6854

CSO: 1813/056

EARTHQUAKE RESISTANCE STRUCTURE OF KPED BUILDING DISCUSSED

Athens TA NEA in Greek 5 May 81 p 3

[Article by V. Kavvathas: "Neighbor to Radioactivity"]

[Text] On the night of the big earthquake--when all was uncertain and the news reports confused--the residents of Agia Paraskevi had an additional reason to be concerned since they were within walking distance from the Dimokritos Nuclear Research Center [KPED] whose radioactivity could fall into the atmosphere at any moment.

Indeed what took place that night at KPED? To what danger is Athens exposed because of its proximity to the Center? None of the Dimokritos officials--the administration of which shuns publicity--felt it necessary to calm the people. There was a rumor that it [Center] "closed down"--that it sustained "damages." Finally, following the TA NEA probe, and after a considerable delay, the [KPED] administration consented to give an answer.

Question: It was, of course, natural for the earthquakes to cause greater concern among the area's people since KPED uses radioactive substances which if released could pollute the area in the Center's vicinity. For enlightening the public we would like you to tell us:

- a. If the earthquakes have caused damage to the Center's building installations which danger could create concern about radioactivity leakage, and
- b. If a stronger earthquake could cause catastrophic damage to the building installations resulting in the release of radioactive substances and the pollution of the area in the vicinity of KPED.

Answer: As is known, there are KPED buildings where research work is being done using or producing radioactive substances (radioisotopes) or which house radioactive residue or radiation-producing machinery. These installations include the building which houses the Greek experimental reactor.

With regard to your question about earthquakes causing damage to KPED's installations which could cause concern about the release of radioactive substances, we can tell you categorically that the earthquakes did not cause any damage to the Center's installations which could cause even the slightest concern about

radioactive pollution. As concerns your question about the possibility of a stronger earthquake destroying the KPED installations thus causing radioactive pollution in the Center's environs, we must tell you the following:

a. For such a possibility, the earthquake must be of such intensity as to destroy the building installations. If, however, we consider the fact that during the planning and construction of KPED all anti-seismic regulations were minutely implemented and that the installations were built on rocky ground, then only an earthquake of very high intensity could cause their collapse. The probability of an earthquake of such intensity is exceedingly small.

But let us assume that such an earthquake does occur. In such a case what will happen to the Athens area is left to the reader's imagination. As far as KPED is concerned we can make the following predictions:

1. According to international regulations and findings, the area around the building whose installations are being used for experiments with small quantities of radioactive substances faces no danger at all of being exposed to radioactive pollution in the event the building is destroyed.
2. The radiation-producing installations do not present any danger for radiation pollution because, as is self-evident, they will cease operating with the collapse of the building housing them. As for the case where radioactive sources are being used for the production of radiation, these sources are shielded in such a way that make impossible the scattering of radioactive substances in the event the building collapses.
3. The building complex where experiments are carried out with a greater quantity of radioactive substances or which houses radioactive residues or produces radiation substances does not threaten the area around KPED with radiation pollution because the present measures in effect limit any radiation pollution only to the area of the complex.
4. Finally, let us consider the case of the building housing the experimental atomic reactor. At the time the building and the pool of the KPED reactor were constructed particular attention was given to the need for earthquake resistance by the whole reactor complex.

The building's static study was made under the responsibility of Polytechnic School Professors Panagiotounakos and Angelidis who applied in their calculations an increased factor of seismic intensity. The static study for the pool was made by Italian Professor Morandi, the best specialist at that time in pre-strengthened structures expert in strength of materials. The area's geological study was made by the then Athens University Professor of Seismology A. Galanopoulos, Athens University Assistant Professor of Geology N. Psarianos and I. Stavropodis, seismological laboratory assistant.

The reactor core which contains the combustible nuclear fuel--in this case uranium 235--is located deep in the large water pool which is about 10 meters high. The various fission radioactive products are accumulated in this core. But such products remain hermetically sealed in the fissionable elements and

their leakage is impossible as is, therefore, the pollution of the surrounding area. The only danger--rather theoretical--of polluting the area lies in the complete melting of the fissionable elements and the emission of the radioactive products from the fission into the atmosphere. For this to occur, the reactor should be in operation at the time an earthquake occurs and all the water in the pool is suddenly lost thus exposing the reactor core--something exceptionally improbable because of the pool's special construction. Indeed, the pool which is constructed with pre-strengthened concrete has exceptional resistance and in addition is lined with steel which is not susceptible to oxidation.

This pool is located in the center of the reactor building and in the event of an earthquake it moves independently of the building. It swings, that is, as an independent, strongly walled container in the center of the building housing it. Therefore, the radiation pollution of the area outside KPED, which can be caused only by complete leakage of the water as a result of the pool's destruction, is improbable. And if we take into consideration the exceptionally small probability of such a high intensity earthquake occurring in Greece, and in the KPED area in particular, the probability of the area of the KPED vicinity being polluted from radiation from the experimental reactor is next to impossible.

For a more comprehensive enlightenment of your readers we would like to add that even though the principle on which all reactors operate is the same, the reactors used for research are less powerful than those used for producing electricity whose power is 100 times greater while the fission radioactive products accumulated in the fissionable elements of the experimental reactors are much less than those of commercial reactors. In addition, in the experimental reactors such as the one KPED uses, the water cooling system operates at a low temperature and pressure (temperature of 38° Celsius and pressure of one atmospheric) compared to the reactors for the production of electrical energy whose cooling water is at a high temperature (on the order of 350° Celsius) and pressure (almost 200 atmospheres). For the above reasons, the research reactors are installed in buildings within large cities or even in universities because this way various nearby research activities are being served and isotopes are being produced for use by hospitals.

The Crew

Question: How many buildings has the Industrial Radiography Crew [SVA] monitored since the earthquake and which ones? Why did it not respond to the appeals of citizens referred to it by KPED? What exactly are the crew's duties?

Answer: The KPED crew deals only with cases where public agencies are directly interested (either because they need such service or because the relevant matter is under their jurisdiction).

In the case of taking radiographs of buildings possibly damaged as a result of the recent earthquakes, KPED sent a letter to the Public Works Ministry which had jurisdiction in the matter, expressing its desire to offer its cooperation and stipulated at the same time its exact capability in taking radiographs of concrete. It should be noted at this point that these capabilities--in personnel and technical means--are very limited. Many days are needed to take radiographs of a building.

Characteristic is the case of the Commerce Ministry building at Kanningos Square where the crew spent about 30 hours to radiographically check only three "locations."

It is evident from the foregoing that KPED could offer its services only to an extremely limited number of buildings which, moreover, should be so selected as to make the radiography method applied to them somewhat meaningful.

But KPED has neither the capability nor the jurisdiction to proceed with such selection and for this reason it applied to the appropriate agency in each case as mentioned earlier. It should also be mentioned that there exist private companies which are adequate enough to carry out similar [radiography] work.

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June 12, 1981